

Appl. No. : 10/042,244
Filed : January 11, 2002

AMENDMENTS TO THE CLAIMS

Claims 12-47 are pending. Please amend Claims 12-21, 22, 26, 36, and 41.

1.-11. (Canceled)

12. (Currently amended) A ~~modified~~ plating solution for simultaneous polishing and planarization of a substrate, comprising:

a solvent;

an ionic species of a conductive material; and

an oxidizer, wherein a concentration of the oxidizer is selected for depositing the conductive material on the substrate while a surface of the conductive material is polished by a pad to achieve a planar surface.

13. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said oxidizer is selected from the group consisting of ~~an inorganic oxidizer~~, an organic oxidizer and a mixture of an organic oxidizer and an inorganic oxidizer, and mixtures thereof.

14. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said oxidizer is an organic nitrite selected from the group consisting of alkyl nitrites, aromatic nitrites, and polyaromatic nitrites.

15. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said solution has a pH value of less than 4.

16. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said oxidizer is present in an amount of more than 500 ppm.

17. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said oxidizer is present in an amount of 0.01 to 10 wt.% of said solution.

18. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said conductive ~~metal~~ material is Cu.

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19. (Currently amended) A ~~modified~~ plating solution according to Claim 12, wherein said conductive ~~metal~~ material is selected from the group consisting of W, Au, Ni, Pt, Pd, Ag, Co, Sn, Pb, and their alloys.

20. (Currently amended) A ~~modified~~ plating solution according to Claim 12, further comprising at least one additive selected from the group consisting of levelers, brighteners, grain refiners, wetting agents, and stress-reducing agents.

21. (Currently amended) A plating solution for plating a conductive layer on a surface of a substrate, comprising:

a solvent;

an ionic species of a conductive material; and

an oxidizer, wherein the oxidizer is present in the plating solution in an amount suitable for simultaneous deposition and polishing of the conductive material on the substrate to achieve a planar surface of the conductive material.

22. (Currently amended) A plating solution according to Claim 21, wherein said oxidizer is selected from the group consisting of an inorganic oxidizer, ~~an organic oxidizer~~, and a mixture of an inorganic oxidizer and an organic oxidizer ~~mixtures thereof~~.

23. (Previously presented) A plating solution according to Claim 21, wherein said oxidizer is an organic nitrite selected from the group consisting of alkyl nitrites, aromatic nitrites, and polyaromatic nitrites.

24. (Previously presented) A plating solution according to Claim 21, wherein said solution has a pH value of less than 4.

25. (Previously presented) A plating solution according to Claim 21, wherein said oxidizer is present in an amount of 0.01 to 10 wt.% of said solution.

26. (Currently amended) A plating solution according to Claim 21, wherein said conductive ~~metal~~ material is Cu.

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27. (Previously presented) A solution according to claim 23, wherein the oxidizer is butyl nitrite.

28. (Previously presented) A solution according to claim 21, wherein the oxidizer is an organic nitrate selected from the group consisting of alkyl nitrates, aromatic nitrates, and polyaromatic nitrates.

29. (Previously presented) A solution according to claim 28, wherein the oxidizer is butyl nitrate.

30. (Previously presented) A solution according to claim 21, wherein the solution is acidic.

31. (Previously presented) A solution according to claim 30, wherein the solution has a pH value less than or equal to 0.5.

32. (Previously presented) A solution according to claim 21, wherein the solution is used from depositing and planarizing the conductive material on the surface of the substrate.

33. (Previously presented) A solution according to claim 32, wherein the solution is used for sequentially depositing and planarizing the conductive material on the surface of the substrate.

34. (Previously presented) A solution according to claim 32, wherein the solution is used for simultaneously depositing and planarizing the conductive material on the surface of the substrate.

35. (Previously presented) A solution according to claim 21, wherein the solution is recyclable for repeated use.

36. (Currently amended) A method of modifying a plating solution into an enhanced solution for both plating and planarizing a conductive material on a surface of a substrate, the method comprising:

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adding an effective amount of an oxidizer to the plating solution, wherein the addition of the effective amount of the oxidizer modifies the plating solution into the enhanced solution, wherein the conductive material can be deposited and polished in the plating solution to result in a planar surface.

37. (Previously presented) A method according to claim 36, wherein the enhanced solution can be used for plating and planarizing the conductive material on the surface of the substrate in a single process.

38. (Previously presented) A method according to claim 37, wherein the enhanced solution can be used for sequentially plating and planarizing the conductive material on the surface of the substrate.

39. (Previously presented) A method according to claim 37, wherein the enhanced solution can be used for simultaneously plating and planarizing the conductive material on the surface of the substrate.

40. (Previously presented) A method according to claim 36, wherein the pH of the enhanced solution is not appreciably different than the pH of the plating solution.

41. (Currently amended) A method according to claim 36, wherein the oxidizer is selected from the group consisting of an organic oxidizer, ~~an inorganic oxidizer,~~ and a mixture of an organic oxidizer and an inorganic oxidizer ~~mixtures thereof.~~

42. (Previously presented) A method according to claim 36, wherein the oxidizer is an organic nitrite selected from the group consisting of alkyl nitrites, aromatic nitrites, and polyaromatic nitrites.

43. (Previously presented) A method according to claim 42, wherein the oxidizer is butyl nitrite.

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44. (Previously presented) A method according to claim 36, wherein the oxidizer is an organic nitrate selected from the group consisting of alkyl nitrates, aromatic nitrates, and polyaromatic nitrates.

45. (Previously presented) A method according to claim 44, wherein the oxidizer is butyl nitrate.

46. (Previously presented) A method according to claim 36, wherein the oxidizer has a concentration range of less than 500 ppm.

47. (Previously presented) A method according to claim 36, wherein the oxidizer has a concentration of 0.01 to 10 weight percent of the enhanced solution.